

SUPPRESSED DISCOVERIES IN PHYSICS

When evidence comes to light that questions cherished theories, the usual practice of the scientific establishment is to reject it, not publish it, and denigrate it along with its discoverer.

Part 1 of 2

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Textbooks present science as a noble search for truth, in which progress depends on questioning established ideas. But for many scientists, this is a cruel myth. They know from bitter experience that disagreeing with the dominant view is dangerous—especially when that view is backed by powerful interest groups. Call it suppression of intellectual dissent. The usual pattern is that someone does research or speaks out in a way that threatens a powerful interest group, typically a government, industry or professional body. As a result, representatives of that group attack the critic's ideas or the critic personally—by censoring writing, blocking publications, denying appointments or promotions, withdrawing research grants, taking legal actions, harassing, blacklisting, spreading rumors.

— Brian Martin, "Stamping Out Dissent"¹

Science is in a state of crisis. Where free inquiry, natural curiosity, open-minded discussion and consideration of new ideas should reign, a new orthodoxy has emerged. This "new inquisition", as it has been called by Robert Anton Wilson,² consists not of cardinals and popes but of the editors and reviewers of scientific journals, of leading authorities and self-appointed "sceptics", and last but not least of corporations and governments that have a vested interest in keeping the status quo, and it is just as effective in suppressing unorthodox ideas as the original Inquisition was.

The scientists on the editorial boards of journals who decide which research is fit to be published and which is not, the scientists at the patent offices who decide what feats nature allows human technology to perform and which ones it does not, and the scientists in governmental agencies who decide what proposals to fund and not to fund, either truly believe they are in complete knowledge of all the fundamental laws of nature or they purposely suppress certain discoveries that threaten the scientific prestige of individuals, institutions or economic interests. Research which indicates that an accepted theory is incomplete, severely flawed or completely mistaken will be rejected on the grounds that it "contradicts the laws of nature", and therefore has to be the result of sloppiness or fraud. At the heart of this argument is the incorrect notion that *theory overrides evidence*. In true science, theory always surrenders to the primacy of evidence. If observations are made that after careful verification and theoretical analysis are found to be inconsistent with a theory, then that theory has to go—no matter how aesthetically pleasing it is, or how prestigious its supporters are, or how many billions of dollars a certain industry has bet on it.

But in current mainstream science, the opposite occurs with disturbing regularity. Anomalous evidence is first ignored, then ridiculed; and if that fails, its author is attacked. Scientific conferences will not admit it to be presented, scientific journals will refuse to publish it, and fellow scientists know better than to express solidarity with an unorthodox colleague. In today's scientific world, the cards are just stacked too heavily against true scientific breakthroughs. Too many careers are at stake, too many vested interests are involved for any truly revolutionary advancement in science to take place any more. All too often, scientific truth is determined by the authority of experts and textbooks, not by logic and reason.

Referring to the *fin de siècle* "end of science" mentality and the scientific revolutions following it, Robert G. Jahn writes in "20th and 21st Century Science":³

"As we enter the 21st century, science seems poised to execute a similar evolutionary cycle of advancement of their comprehension and relevance. We are opening with a steadily growing backlog of demonstrable physical, biological and psychological anomalies...most of which seem incontrovertibly correlated with properties and processes

of the human mind, in ways for which our preceding 20th century scientific paradigm has no rational explanations...

"Thus, at the dawn of the 21st century, we again find an elite, smugly contented scientific establishment, but one now endowed with far more public authority and respect than that of the prior version. A veritable priesthood of high science controls major segments of public and private policy and expenditure for research, development, construction, production, education and publication throughout the world, and enjoys a cultural trust and reverence that extends far beyond its true merit. It is an establishment that is largely consumed with refinements and deployments of mid-20th century science, rather than with creative advancement of fundamental understanding of the most profound and seminal aspects of its trade.

"Even more seriously, it is an establishment that persists in frenetically sweeping legitimate genres of new anomalous phenomena under its intellectual carpet, thereby denying its own well-documented heritage that anomalies are the most precious raw material from which future science is formed."

In his debut editorial as Editor-in-Chief of the *Journal of Scientific Exploration*, Henry H. Bauer⁴ gives a similarly bleak assessment of the state of modern science:

"Mainstream orthodoxy routinely resists novelties that later become accepted. Throughout the 20th century there are examples: Bretz's Spokane flood, McClintock's recognition of "jumping genes", Mitchell's insights into biological energy mechanisms, Woese's Archaea, and McCully's homocysteine. Only late in the 20th century did science reluctantly grant that acupuncture can have some analgesic effect, that ball lightning exists, that the kraken is not myth but the real giant squid, that it is not foolish to look for intelligent life outside the Earth, that 5,000-year-old megaliths incorporate substantial knowledge of astronomy, that human beings inhabited the Americas long before the days of the Clovis culture, and that living systems can sense not only electrical but also magnetic fields. Indeed, it may well be that the suppression of unorthodox views in science is on the increase rather than in decline.

"In *Prometheus Bound* (1994), John Ziman has outlined how science changed during the 20th century: traditionally (since perhaps the 17th century) a relatively disinterested knowledge-seeking activity, science progressively became handmaiden to industry and government, and its direction of research is increasingly influenced by vested interests and self-interested bureaucracies, including bureaucracies supposedly established to promote good science such as the National Academies, the National Science Foundation, and the National Institutes of Health. Parkinson's Law, it may be, applies to science as to other human activities: no sooner has an organization become successfully established than it is by that token already an obsolescent nuisance."

Anomalous evidence that inconveniences establishment science is usually disposed of by denying publication or simply ignoring the evidence after it has been published and moving on as if nothing had happened. But some renegade scientists manage to capture the attention of the general public, pleading their case to a larger audience that has no vested interest in the validity of the

established theories. When that happens, and significant interests are at stake, the scientific establishment will turn nasty, resorting to misrepresentation or outright falsification of evidence and even character assassination.

It will be shown below that all these methods of suppression have been deployed against paradigm-shattering discoveries in physics.

THE COLD FUSION SCANDAL

In March 1989, Drs Stanley Pons and Martin Fleischmann⁵ announced that they had achieved fusion by electrochemical means. Their discovery not only threatened to deprive the multi-billion-dollar "hot" fusion program of prestige and funding, it also called into question everything nuclear physics knew, or thought it knew. The physics establishment decided that the discovery was "pathological science", thereby changing the subject from whether a new discovery had been made to whether Pons and Fleischmann were con artists or just incompetent.

Several influential US laboratories (Caltech,⁶ MIT,⁷ Yale/Brookhaven⁸) reported negative results on "cold fusion" that were based on shoddy experimental work and a misunderstanding of the Pons-Fleischmann claims.⁹ They gave a hostile "hot fusion" establishment the excuse it needed to conclude that the claims made by Pons and Fleischmann were bogus. In November 1989, a Department of Energy panel concluded the same after a shallow mock investigation of only seven months.¹⁰

Dr Eugene F. Mallove, who was the Chief Science Writer at the MIT News Office at the time and now publishes *Infinite Energy*, a journal dedicated to covering potential new energy sources ignored by mainstream science, played a part in exposing the MIT report as mistaken, possibly fraudulent,¹¹ and in 1991 resigned in protest over it. He writes in "Ten Years That Shook Physics":¹²

"The 1989 reports of MIT, Caltech, and Harwell have each been analyzed by other scientists and these analyses have been published (see references, page 34, in *IE* issue no. 24). Each of the widely cited 1989 'null' experiments has been found to be deeply flawed in experimental protocols, data evaluation, and presentation. Each, in fact, contained some evidence of excess heat as claimed by Fleischmann and Pons. There is evidence that the MIT data was deliberately altered to erase an indication of excess heat. The altered data was published officially by MIT, and it was included in reports to a government agency under the official seal of MIT. The experiment was paid for out of federal government funds. This report had a dramatic impact on the perception of many scientists and journalists.

"It is ironic that each of these negative results [was] the product of the kind of low-quality work of which Fleischmann and Pons were accused. The difference was that the reports said what the hot fusion community wanted to hear. This was the legacy of the 1989 ERAB report, but that legacy must now be reversed—and it will be, however long that takes.

"Almost two years after they were concocted, Prof. Ronald R. Parker of MIT's Plasma Fusion Laboratory publicly stated that the MIT PFC cold fusion calorimetry data were 'worthless' (June 7, 1991). In the same period after I had challenged this data, Parker stated that 'MIT scientists stand by their conclusions' (August 30,

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1991). "Which is it?" (A detailed chronology of this scientific cover-up can be found in the same issue of *Infinite Energy*.¹³)

Most people, including physicists, continue to be unaware that low-energy nuclear reactions (LENR) are real, and have been verified in hundreds of experiments throughout the 1990s.

In February 2002, the Space and Naval Warfare Systems Center of the United States Navy in San Diego released a 310-page report, titled "Thermal and Nuclear Aspects of the Pd/D₂O System",¹⁴ that discusses the overwhelming experimental evidence that the cold fusion effect indeed exists. Dr Frank E. Gordon, Head of the Center's Navigation and Applied Sciences Department, writes in the foreword:

"We do not know if Cold Fusion will be the answer to future energy needs, but we do know the existence of Cold Fusion phenomenon through repeated observations by scientists throughout the world. It is time that this phenomenon be investigated so that we can reap whatever benefits accrue from additional scientific understanding. It is time for government funding organizations to invest in this research."

A March 2003 *New Scientist* article¹⁵ quotes Robert Nowak, an electrochemist and a program manager in chemistry at the Office of Naval Research (ONR), and Melvin Miles, an electrochemist working with the Naval Air Warfare Center, on the suppression efforts that the US Navy research had to overcome:

"From the beginning, the idea was to keep things modest. 'We put less than \$1 million a year into the programme,' Nowak says. 'Above that level, the red flags go up.' [ONR Executive Director Fred] Saalfeld and Nowak never gave the programme its own line in the ONR's budget, but allotted money to it from miscellaneous funds. 'We were to keep working and we were allowed to publish our results, but we weren't supposed to say a lot about it,' Miles recalls. 'Some people were worried that word would get out and it would jeopardise the navy labs' funding from Congress for other research. We didn't even call it 'cold fusion'. We called it 'anomalous effects in deuterated systems'."

"That was still not enough to keep the sceptics off their backs. 'Fairly prominent individuals within the physics community voiced threats,' Nowak admits. 'They said that they were aware that federal funds were going into cold fusion research and they were going to do what they could to stop it.'"

That "cold fusion" continues to be ignored by the scientific establishment, and, to add insult to injury, is being used synonymously with "bad science", usually in such expressions as "the cold fusion debacle", constitutes one of the greatest scientific scandals in human history and a human tragedy. While wars over oil are being fought, a potential source of energy that could solve humanity's energy problems for all eternity is being ignored by all but a small community of researchers. At the same time, the dead-end "hot fusion" program continues to receive billions of dollars in public funds. If there is a scandal associated with cold fusion, *this* is it.

So addicted is the plasma fusion community to government research funds, that even innovative concepts for hot fusion which threaten to lead to practical fusion energy soon—and to a corresponding gigantic embarrassment for the hot fusion establishment—are viciously suppressed.

A recent example is the suppression effort aimed at "focus fusion". Plasma physicists Eric J. Lerner, Dr Bruce Freeman and Dr Hank Oona used an innovative design to achieve hydrogen–boron fusion, which, unlike the deuterium–tritium reaction which the hot fusion mainstream is trying to create, produces no lethal neutrons. Yet the discovery met with stiff resistance from the hot fusion establishment, perhaps because it threatened the funding and prestige of the hot fusion program. A 2002 press release from the Focus Fusion Society¹⁶ describes the suppression attempts:

"On May 23rd Dr Richard Seimon, Fusion Energy Science Program Manager at Los Alamos, demanded Dr Hank Oona, one of the physicists involved in the experiment, dissociate himself from comparisons that showed the new results to be superior in key respects to those of the tokamak and to remove his name from the paper describing the results. The tokamak, a much larger and more expensive device, has been the centerpiece of the US fusion effort for 25 years.

"Seimon did not dispute the data or the achievement of high temperatures. He objected to the comparisons with the tokamak, arguing that it [*sic*] was biased against the tokamak. In addition, Seimon pressured Dr Bruce Freeman, another co-author of the paper, to advocate the removal of all tokamak comparisons from the paper.

"Both of my colleagues in this research have been threatened with losing their jobs if they don't distance themselves from the comparisons with the tokamak,' says Lerner who is lead author on the paper. 'Both of them had carefully reviewed and approved the paper originally and had endorsed its

conclusions. For them to be forced to recant under threat of firing is outrageous. It undermines the very basis of scientific discourse if researchers are not allowed by their institutions to speak honestly to each other..."

If the claims about focus fusion pan out, it could be the cheap, clean, inexhaustible source of energy that the hot fusion establishment has been promising the world for half a century but has failed to deliver.

TRANSMUTATION CONTROVERSY

If a new class of nuclear reactions can take place under low-energy conditions, then it is reasonable to expect even transmutations of heavy elements. But to conventional chemistry and physics, the claim of heavy elemental transmutations occurring in "chemical" systems, apparently validating the ancient proto-science of alchemy, constitutes an even greater provocation than cold fusion.

John Bockris, a distinguished professor of chemistry at Texas A&M and one of the world's leading electrochemists, had to learn this lesson in the early years of the cold fusion scandal. He

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successfully replicated the Pons and Fleischmann experiment in 1989 and discovered bursts of tritium production.

He then became one of the principal targets of a smear campaign against cold fusion research by science journalist Gary Taubes. Taubes was writing a book on cold fusion and had already made up his mind that cold fusion was "pathological science".¹⁷ He spent time with Bockris and his students at Texas A&M, posing as a disinterested seeker of the truth. There he got the idea that Nigel Packham, one of Bockris's graduate students, had "spiked" the cold fusion cell with tritium. The allegation was utterly baseless, but Taubes was out for blood and needed to have his scandal. He got *Science* to publish his allegations, which it did in its June 15, 1990 issue.¹⁸ Bockris called the editor and asked for the right to publish a detailed response, but his request was denied. Eventually, he managed to get a one-column letter published, denying the allegations and calling Taubes's piece a "gossip-based account".¹⁹

Publication of Taubes's paranoid delusions in *Science* gave them wide credence and circulation. A fair-minded article published in *Wired* in 1998 sets the record straight:²⁰

"We thought Taubes was genuine at first," Bockris told me recently, speaking in a clipped, precise British accent that he acquired before he moved to the United States in 1953. 'We exposed our lab books to him, and told him our results. But then he said to Packham, my grad student, 'I've turned off the tape, now you can tell me—it's a fraud, isn't it? If you confess to me now, I won't be hard on you, you'll be able to pursue your career.'

"(Taubes has been shown Bockris's statement. He prefers not to comment.)

"According to Bockris, 'A postdoctoral student named Kainthla and a technician named Velev both detected tritium and heat after we took Packham off the work because of the controversy. Since then, numerous people have obtained comparable results.

"In 1994, I counted 140 papers reporting tritium in low-temperature fusion experiments. One of them was by Fritz Will, the president of The Electrochemical Society, who has an impeccable reputation.'

"Still, Taubes's report in the June 1990 *Science* magazine clearly suggested that Packham might have added tritium to fake his results. This reassured many people that cold fusion had been bogus all along. Packham received his PhD, but only on condition that all references to cold fusion be removed from the body of his thesis. Today he works for NASA, developing astronaut life-support systems. 'I don't know why Gary Taubes wrote what he did,' he says. 'Certainly I did not add any tritium in my experiment.'"

But for Bockris, the worst was yet to come. In 1991, he was approached by Joe Champion, an inventor from Tennessee who claimed he had found a process that could perform heavy element transmutation. Bockris eventually brought Champion to Texas A&M as a consultant and started experiments to replicate the claimed results.

In 1993, the local media got wind of the research and made it widely known that mediaeval alchemy was being performed at the university! This led to a second, even nastier, scientific witch hunt against Bockris. Twenty-three distinguished professors at Texas A&M signed a petition to the provost, asking that Bockris be stripped of his title, and 11 full professors in the Chemistry Department wrote a letter asking that Bockris be removed from the department. The petition stated:²¹

"...we believe that Bockris' recent activities [have] made the terms 'Texas A&M' and 'Aggie' objects of derisive laughter throughout the world... For a trained scientist to claim, or support anyone's claim, to have transmuted elements is difficult for us to believe and is no more acceptable than to claim to have invented a gravity shield, revived the dead or be mining green cheese on the moon..."

Bockris was subsequently investigated for fraud, based on charges that he was trying to defraud investors with false claims of being able to manufacture gold. He was "completely exonerated" only one week after a January 1994 hearing in which he had been allowed to present his research and defend himself.

The professors in the Chemistry Department who had initiated the investigation, led by Distinguished Professor Frank A.

Cotton, were disappointed at this outcome. So they secretly formed a committee to start yet another investigation. Bockris learned of the existence of this "Ad Hoc Committee" only when information of its existence was leaked to the press in June 1994. In classic totalitarian fashion, he was subsequently denied the right to defend himself before the committee and even to know what the charges were. He later learned that he was being investigated because his results were "impossible".

After 11 months of investigation, Bockris was exonerated again in May 1995. But the official investigation is only part of the story. An article in *Infinite Energy*,²² which describes the entire affair in full detail, suggests a psychological explanation for the unscientific conduct of Bockris's colleagues:

"One of the most difficult aspects of the treatment to which Bockris was subjected was social ostracism, starting with Dean [Dr W. Michael] Kemp's accusation and not even ending with the second exoneration. There were about sixty-five professors in the large Chemistry Department at Texas A&M. Most ignored Bockris for much of the two-year period in which the

University, egged-on by ring-leaders in the Department, acted against him. After the first complete exoneration, two professors did congratulate him, but he was isolated.

"Bockris' wife Lilli felt it perhaps more than he, because she had a number of faculty wives whom she had known as friends. When she met them now in the supermarket, instead of having the usual kindly chat, they turned their backs on her. Lilli recalls that the year she spent in Vienna after the Nazis took over seemed to her less unpleasant and threatening than the isolation and nastiness which she felt in College Station, Texas, from 1993 through 1995.

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"One would have thought that after all that had been done, everything would be settled now. This was not the attitude of many of Bockris' colleagues. The motivating force for the antipathy may be the subconscious fear that the discoveries of the Bockris group might eventually be proved and recognized. Then his original contributions would be rated as discoveries of great magnitude. There were at least two professors in the Chemistry Department who had made it known that they expected to receive the Nobel Prize in Chemistry some day. The possibility that it might go instead to a colleague whose work they so much denigrated must have been an unwelcome thought.

"(They did not have the attitude of physicist Richard Feynman, who was displeased by the artificial focus on one person's accomplishment that the Nobel Prize system encouraged.)

"Having failed in the three official investigations that had been carried out against Bockris, they decided that all they could do would be to persuade the head of the department to have Bockris shunned—as in an excommunication for religious heresy. No one was supposed to speak with the errant Bockris. For a long time, absorbed in his work as ever, he didn't understand that shunning was underway. Most of the colleagues had been ignoring him anyway since the inquiries had begun in 1993.

"He did notice, however, that whenever he wanted to talk to the Head of the Department, perhaps once every few months, he [the Head] came to his office and did not invite Bockris to come to his. Of course, he was more than twenty years younger than Bockris, but later Bockris realized that this was an example of the shunning. The Head did not want anyone to see that he was talking collegially with Bockris!

"Bockris' colleagues in the physical chemistry division took no notice of the shunning order, which might have gone around unofficially. In practice, the shunning made no effective difference to how Bockris carried out his work, though it was a very considerable act of spite. It proved once again that at least in the Chemistry

Department at Texas A&M University, research results which do not agree with existing theory are not tolerated."

The *Wired* article²³ suspects financial motives behind the scientific establishment's anti-scientific witch hunt:

"Financial factors may have played a part in the fierce animosity exhibited toward cold fusion experiments. When a congressional subcommittee suggested that \$25 million could be diverted from hot fusion research to cold fusion, naturally the hot fusion scientists were outraged."

Today, the evidence that transmutation of heavy elements can occur in electrochemical systems has become fairly strong. Yasuhiro Iwamura, Mitsuru Sakano and Takehiko Itoh of the Mitsubishi Advanced Technology Research Center in Japan have shown reproducible transmutation of caesium (Z=55) into praseodymium (Z=59) and strontium (Z=38) into molybdenum (Z=42) in a deuterium-palladium system. Their results were published in 2002 in the *Japanese Journal of Applied Physics*.²⁴

These results were recently independently replicated by T. Higashiyama *et al.* at Osaka University and presented at the Tenth International Conference on Cold Fusion in Cambridge, Massachusetts, on August 24–29, 2003.²⁵

At <http://www.lenr-canr.org>, the interested reader can find a

comprehensive collection of papers on low-energy nuclear reactions.

DOUBTS ABOUT VALIDITY OF RELATIVITY THEORY

Einstein's theory of *special relativity* (SR), published in 1905, is one of the foundational theories of modern physics. It states that the vacuum speed of light is the same in every direction for all observers in initial (non-accelerated) reference frames, and that time and space coordinates combine in a peculiar way when measured from different inertial systems. Exactly how this happens is described by a set of equations called the *Lorentz transformation*.

Strictly speaking, special relativity theory does not apply to anything in the physical universe, since gravitational fields, however minute, are always present. It took Einstein about 10 years to incorporate gravity and acceleration into his theory, and the result is known as *general relativity* (GR). It describes gravity not as a force, but as curvature of space-time caused by mass. According to general relativity, there can be no such thing as a gravity shield.

Despite the consensus of a majority of physicists that special relativity is proven beyond a shadow of a doubt, there is a well-reasoned experimental and theoretical case *against* its validity. But relativity dissidents are routinely censored from presenting their ideas at conferences or having them published in the scientific literature.

John E. Chappell, Jr, the late Director of the Natural Philosophy Alliance (an organisation of relativity critics), relates the following suppression experience:²⁶

"There has been a particularly vicious attitude towards critics of Einsteinian relativity at UC Berkeley... I ran into it in 1985, when I read a paper arguing for absolute simultaneity at that year's International Congress on the History of Science. After I finished, the Danish chairman made some courte-

ous remarks about dissidents he had learned about in Scandinavia, and then turned to the audience for questions. The first speaker was one of a group of about four young physics students in the back. He launched immediately into a horrible tirade of verbal abuse, accusing me of being entirely wrong in my analysis, a simplification of the Melbourne Evans analysis—'Evans is wrong; you are wrong,' he shouted. He accused me of being way out of line to present my 'faulty' arguments on his prestigious campus. When I started to ask him 'Then how would you explain...!', he loudly interrupted me with 'I don't have to explain anything.' The rest of the audience felt so disturbed by all this that the question session was essentially destroyed."

Such reactions are not uncommon. Even to begin to criticise Einstein's theory of special relativity has become a scientific heresy of the highest order.

The prevailing attitude of the physics establishment is that anyone who doubts the validity of this "bedrock of modern physics" is insane, and that trying to refute it is a symptom of "psychosis".²⁷

Caltech Professor David L. Goodstein states in a videotaped lecture titled "Atoms to Quarks":²⁸

"There are theories in science, which are so well verified by experience that they become promoted to the status of fact. One

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example is the special theory of relativity—it's still called a 'theory' for historical reasons, but it is in reality a simple, engineering fact, routinely used in the design of giant machines, like nuclear particle accelerators, which always work perfectly. Another example of that sort of thing is the theory of evolution. These are called 'theories', but they are in reality among the best established facts in all of human knowledge."

Isaac Asimov has stated that "no physicist who is even marginally sane doubts the validity of SR".²⁹

An article on relativity dissidents³⁰ quotes relativist Clifford Will of Washington University expressing a similar sentiment:

"SR has been confirmed by experiment so many times that it borders on crackpot to say there is something wrong with it. Experiments have been done to test SR explicitly. The world's particle accelerators would not work if SR wasn't in effect. The global positioning system would not work if special relativity didn't work the way we thought it did."

Unfortunately for the progress of physics, when opinions like these reach a critical mass, they become self-fulfilling prophecies. Dissent is no longer respected or even tolerated. Evidence to the contrary can no longer be communicated, for the journals will refuse to publish it.³¹

Mathematically and logically, the notion that a theory that has made many correct predictions must necessarily be true is untenable. Scientific models can produce arbitrarily many, arbitrarily good predictions and still be flawed, as the historical example of the Ptolemaic (geocentric) model of the solar system shows. It does not matter how many observations are consistent with a theory if there is only one observation that is not. Ironically, relativity itself should have driven this point home to physicists long ago.

For centuries, Newtonian physics had led science to one triumph after another in explaining the inner workings of the natural world, and at the end of the 19th century no physicist who was "even marginally sane" doubted its validity.

After all, hadn't the validity of Newtonian physics "been confirmed by experiment so many times" that it "borders on crackpot to say there is something wrong with it"? Didn't the operation of the world's steam engines prove its validity? And yet, Newtonian physics loses its validity at speeds approaching the speed of light. In hindsight, it is obvious why the discrepancy was never caught. Due to the enormity of the speed of light, c , effects of the order of v/c only manifest themselves in highly sophisticated experiments.

Similarly, even modern technology cannot easily distinguish between relativity and competing theories that agree with relativity at first order of v/c but disagree at higher order. One such competing theory is Ronald Hatch's Modified Lorentz Ether-gauge Theory (MLET).³²

Hatch, a former President of the Institute of Navigation and the current Director of Navigation Systems Engineering at NavCom Technologies, is one of the world's foremost experts on the global positioning system (GPS). Concerning the question of whether the operation of the GPS proves the validity of SR, he has come to conclusions diametrically opposite to those reached by Clifford

Will. In "Relativity and GPS",^{33,34} he argues that the observed effect of velocity on the GPS clocks flat out contradicts the predictions of special relativity.

Hatch's proposed alternative to special and general relativity theory, MLET, agrees with general relativity at first order but corrects many astronomical anomalies that GRT cannot account for without *ad hoc* assumptions, such as the anomalous rotation of galaxies and certain anomalies in planetary orbits. In addition, the force of gravity is self-limiting in MLET, which eliminates point singularities (black holes), one of the major shortcomings of GRT. One of the testable predictions of Hatch's theory is that LIGO, the Laser Interferometer Gravitational Wave Observatory, will fail to detect any sign of gravity waves.

The Michelson–Morley and Aether Drift Experiments

Relativity textbooks all contain the story of how the Michelson–Morley experiment³⁵ supposedly proved the non-existence of a light-carrying medium, the aether.

In this experiment, light rays were sent on round trips in different directions and then reunited, resulting in an interference pattern. If an aether "wind" caused the speed of light to be direction-dependent, then rotation of the experimental apparatus would result in a shift of this pattern. But such a shift was never detected, proving the isotropy (direction independence) of the speed of light—or so the story goes.

But physical reality is more complicated than the foundational myth of relativity would have us believe. An examination of historical papers on the subject indicates that relativists have rewritten history. The M–M experiment of 1887 found only a fraction of the effect size predicted by the stationary aether hypothesis, thus clearly disproving it, but the effect was emphatically not "null" within the accuracy of the experiment.

Dayton C. Miller reviews the evidence in "The Ether-Drift Experiments and the Determination of the Absolute Motion of the Earth" (1933)³⁶ and concludes that:

"The brief series of observations was sufficient to show that the effect did not have the anticipated magnitude. However, and this fact must be emphasized, *the indicated effect was not zero*; the sensitivity of the apparatus was such that the conclusion, published in 1887, stated that the observed relative motion of the Earth and ether did not exceed one-fourth of the Earth's orbital velocity.

This is quite different from a null effect now so frequently imputed to this experiment by the writers on Relativity."

Miller then discusses the original M–M data and shows that there is a systematic effect indicating a speed of the Earth relative to the aether of 8.8 km/s for the noon observations and 8.0 km/s for the evening observations.

Relativity sceptics like Miller believed that the aether may be entrained ("dragged along") by the Earth. To test this hypothesis, Miller endeavoured to replicate the M–M experiment (which had been performed in a basement in Cleveland) at greater altitude on Mount Wilson, where presumably there would be a stronger aether drift. After years of careful experimentation, Miller indeed

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found a systematic deviation from the null result predicted by SR, which greatly embarrassed Einstein and his followers. Einstein tried to explain it away as an artefact of temperature variation, but Miller had taken great care to avoid precisely that kind of error.

Miller told the Cleveland *Plain Dealer* on January 27, 1926:

"The trouble with Professor Einstein is that he knows nothing about my results... He ought to give me credit for knowing that temperature differences would affect the results. He wrote to me in November suggesting this. I am not so simple as to make no allowance for temperature."

But the tide of scientific opinion had turned against the aether and in favour of Einstein. The 1919 solar eclipse observations led by Sir Arthur Eddington, which allegedly confirmed general relativity's prediction of the deflection of starlight by a gravitational field, were so ambivalent and poorly performed that they were scientifically worthless,³⁷ but thanks to Eddington's authority they were accepted as a resounding confirmation. Some of the stars had moved in the direction predicted by Einstein, but not as much or too much; others had even moved in the opposite direction.

Confirmation was obtained by the "scientific" device of discarding the data that didn't fit the prediction and retaining the data that did. The "confirmation" was triumphantly announced by Eddington at a joint meeting of the Royal Society and the Royal Astronomical Society to an audience that had not actually seen the data first hand. In the judgement of an eyewitness, the meeting resembled a coronation ceremony rather than a scientific conference.³⁸

Because of this scientific fraud, Einstein became a world celebrity overnight, surrounded by an aura of scientific infallibility. Miller's results—which suggested that in order to detect anisotropies in the speed of light, the interferometer needed to be surrounded by as little matter as possible and located at a high altitude—were ignored in subsequent tests of the isotropy of the speed of light, such as the Brilliet–Hall experiment³⁹ and, recently, the Müller experiment.⁴⁰

After Miller's death, one of his students, Robert S. Shankland, gave the physics establishment the final excuse it needed to forget Miller's work for good.⁴¹ Shankland simply revived the old criticism of temperature variations, against which Miller had always

successfully defended himself during his lifetime, to reach the conclusion that Miller's results must be invalid. Some relativity sceptics believe that that conclusion was preordained by Shankland's manifest devotion to Einstein, which is evident in his writing.^{42,43}

One of these sceptics, James DeMeo, PhD, has undertaken a detailed review of Miller's work and Shankland's critique⁴⁴ that comes to the conclusion that the Shankland team "with some degree of consultation with Einstein, decided that 'Miller must be wrong' and then set about to see what they could find in his archive that would support that conclusion".

It must be noted, however, that Miller's determination of the velocity of the Earth relative to the aether is incompatible with modern observations. Miller found that the solar system is moving at a speed of 208 kilometres per second (km/s) towards a point in the Great Magellanic Cloud in the constellation Doradus, in contradiction to modern measurements discussed below.

Even if the alleged null result of the M–M experiment is accepted, the isotropy of the speed of light does not necessarily follow. M. Psimopoulos and T. Theocharis, two physicists at Imperial College, London, point out in a 1986 letter to *Nature*⁴⁵ that the M–M experiment has only been performed in terrestrial laboratories, where the

gravitational field and the magnetosphere of the Earth and other ambient factors are always present, and must therefore be repeated in space before its conclusions can be accepted as universal. They note that:

"...all sorts of experiments have already been conducted in space. But the few experiments which might have truly tested the perhaps most fundamental and controversial hypotheses in twentieth-century physics—Einstein's postulates—have curiously not been done."

Continued next issue...

But the tide of scientific opinion had turned against the existence of the aether and in favour of Einstein.

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Continued on page 76

Suppressed Discoveries in Physics

Continued from page 55

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